

THE BELL SYSTEM

Technical Journal

DEVOTED TO THE SCIENTIFIC AND ENGINEERING
ASPECTS OF ELECTRICAL COMMUNICATION

ADVISORY BOARD

D. E. PROCKNOW

W. L. LINDHOLM

J. B. FISK

EDITORIAL COMMITTEE

W. E. DANIELSON, *Chairman*

F. T. ANDREWS, JR.

S. J. BUCHSBAUM

I. DORROS

D. GILLETTE

J. M. NEMECEK

B. E. STRASSER

D. G. THOMAS

W. ULRICH

F. W. WALLITSCH

EDITORIAL STAFF

L. A. HOWARD, JR., *Editor*

R. E. GILLIS, *Associate*

Editor

J. B. FRY, *Art and*

Production Editor

F. J. SCHWETJE, *Circulation*

Index and Contents

VOLUME 52

1973

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
NEW YORK

LIST OF ISSUES IN VOLUME 52

No. 1, January	Pages	1-146
No. 2, February		147-270
No. 3, March		271-452
No. 4, April		453-604
No. 5, May-June		605-768
No. 6, July-August		769-1036
No. 7, September		1037-1254
No. 8, October		1255-1452
No. 9, November		1453-1680
No. 10, December		1681-1916

Index	iii
Contents	xv

NOTE: Words in parentheses precede words not in parentheses in the same entry.
For example:

Digital Data Scrambler (Universal)

should be read Universal Digital Data Scrambler.

Index to Volume 52

A

- Adaptive Channel Memory Truncation for Maximum Likelihood Sequence Estimation* 1541-62
- ADAPTIVE DIFFERENTIAL PCM CODER 1105-18
- Adaptive Quantization in Differential PCM Coding of Speech* 1105-18
- Adaptive Quantization With a One-Word Memory* 1119-44
- ADPCM CODER *See* ADAPTIVE DIFFERENTIAL PCM CODER
- Algorithm for Minimizing Roundoff Noise in Cascade Realizations of Finite Impulse Response Digital Filters (An)* 347-85
- ANALOG FM COMMUNICATION SYSTEMS (COMPUTING DISTORTION) 627-48
- ANALYTIC FUNCTIONS (INTEGRALS OF) EVALUATED BY TRAPEZOIDAL RULE 707-22
- Applications for Quantum Amplifiers in Simple Digital Optical Communication Systems* 117-33
- ARRAYS (PLANAR SHIFTING, SWITCHING NETWORKS) 991-1007
- ASYMMETRIC HEATING (ELECTRONIC SYSTEMS) 907-25
- ASYMMETRIC SLAB WAVEGUIDES (IMPERFECT, COUPLING COEFFICIENTS) 63-82
- Attenuation Through the Clear Atmosphere at 30, 19, and 13 GHz for Low Elevation Angles* 1031-5
- Aung, W. 907-25

B

- Babler, G. M. 239-61
- BAND LIMITATION (FM WAVE, DISTORTION PRODUCED BY) 605-26
- Baseband Linearity and Equalization in Fiber Optic Digital Communication Systems* 1175-94
- Batch Input to a Multiserver Queue with Constant Service Times* 83-99
- Beneš, V. E. 697-706
- Bennett, J. E. 1325-40
- Berglund, C. N. 147-82

BIAS-CIRCUIT OSCILLATIONS (TUNING-INDUCED, ELIMINATION IN IMPATT OSCILLATORS) 271-306

- Bisbee, D. L. 1579-88
- Bobilin, R. T. 497-525
- Bonyhard, P. I. 307-17
- Brackett, C. A. 271-306
- Brophy, F. J. 1077-95
- BUBBLE MEMORIES (DYNAMIC DATA REALLOCATION) 307-17
- Budrikis, Z. L. 1643-67
- BURIED-CHANNEL CHARGE COUPLED DEVICES (CHARGE DISTRIBUTION) 1009-24
- BURNOUT (TUNING-INDUCED, ELIMINATION IN IMPATT OSCILLATORS) 271-306
- BURST NOISE MODEL (GILBERT'S, STATISTICAL PROPERTIES) 1303-24
- BURST PROCESSES (FORMULAS ON QUEUES) 9-33

C

- CALL-CARRYING CAPACITY (OPTIMUM NETWORK) 1195-214
- CAP *See* CARRIED ARRIVAL PROCESS
- Carlin, J. W. 487-96
- CARRIED ARRIVAL PROCESS (PEAKEDNESS OF TRAFFIC CARRIED BY FINITE TRUNK GROUP WITH RENEWAL INPUT) 1617-42
- CASCADE REALIZATIONS (FIR DIGITAL FILTERS) (Algorithm for Minimizing Roundoff Noise) 347-85 (Theory of Roundoff Noise) 329-45
- CCD *See* CHARGE COUPLED DEVICES
- Chai, D. T. 1681-9
- Chan, D. S. K. 329-45, 347-85, 769-99
- CHANNELS (MULTIPLE ACCESS WITH CORRELATED SOURCES, CODING THEOREM) 1037-76
- Chao, M.-T. 1303-24
- CHARGE COUPLED DEVICES (Buried-Channel, Charge Distribution) 1009-24 (Potential With No Mobile Minority Carriers) 1765-93

- (Potential with No Mobile Minority Carriers and Zero Plate Separation) 669-96
- (250-Element Undercut-Isolated, Measurements of Transfer Inefficiency) 1-7
- Charge Distribution in Buried-Channel Charge-Coupled Devices* 1009-24
- CHARGE TRANSFER (INCOMPLETE, COMPARISON IN CHARGE TRANSFER DEVICES) 147-82
- CHARGE TRANSFER DEVICES (Error Rates of Digital Signals) 1795-809
- (Fundamental Comparison of Incomplete Charge Transfer) 147-82
- (Operational Limitations) 1453-82
- Chin, G. M. 53-62
- Chinnock, E. L. 1579-88
- Chu, T. S. 319-27, 599-604, 1907-13
- CIRCULAR POLARIZATION (EFFECT OF RAIN AT 18 GHz) 1029-31
- CIRCULAR WAVEGUIDE (OVERMODED DIELECTRIC-LINED, NORMAL MODES) 453-86
- CLAD OPTICAL MULTIMODE FIBERS (IMPULSE RESPONSE) 801-16
- CLEAR ATMOSPHERE ATTENUATION 1031-5
- CODECS (INTRAFRAME FOR Picturephone® SERVICE) 497-525
- Coding Theorem for Multiple Access Channels With Correlated Sources (A)* 1037-76
- Coleman, R. D. 1403-22
- COMMUNICATION SYSTEMS (Analog FM, Computing Distortion) 627-48
- (Digital Fiber Optic, Baseband Linearity and Equalization) 1175-94
- (Digital Fiber Optic, Receiver Design) 843-74, 875-86
- (Fiber Optic, Dispersion and Equalization) 1867-76
- (Radio, Restoring the Orthogonality of Two Polarizations) 319-27
- (Simple Digital Optical, Applications for Quantum Amplifiers) 117-33
- (Volterra Series Description of Crosstalk Interference) 649-68
- Compromise Equalizer Design Incorporating Performance Invariance (A)* 1077-95
- COMPUTER SYSTEMS (TIME-SHARED FOR INFORMATION MANAGEMENT) 1681-9, 1691-724, 1725-41, 1743-63
- COMPUTING BASEBAND DISTORTION 605-26, 627-48
- Computing Distortion in Analog FM Communication Systems* 627-48
- Connor, D. J. 35-51
- Cook, J. S. 1439-48
- Coupled Mode Theory of Round Optical Fibers* 817-42
- Coupling Coefficients for Imperfect Asymmetric Slab Waveguides* 63-82
- COUPLING EFFICIENCY OF SINGLE-MODE OPTICAL FIBER BUTT JOINTS (EFFECT OF MISALIGNMENTS) 1439-48
- Cross, M. J. 599-604
- Crosstalk in Uniformly Coupled Lossy Transmission Lines* 101-15
- CROSSTALK INTERFERENCE IN COMMUNICATIONS SYSTEMS (VOLTERRA SERIES DESCRIPTION) 649-68
- CTD See CHARGE TRANSFER DEVICES
- Cummiskey, P. 1105-18

D

- D'Agostino, P. 453-86
- DATA REALLOCATION (DYNAMIC) IN BUBBLE MEMORIES 307-17
- DATA SIGNALS (DIFFERENTIALLY PHASE-MODULATED, PASSBAND EQUALIZATION) 219-38
- DATA SYSTEM (HIERARCHICAL, MASTER LINKS) 1691-724
- DC-to-2.3-GHz Amplifier Using an "Embedding" Scheme (A)* 53-62
- DECISION FEEDBACK EQUALIZATION (Optimum Mean-Square) 1341-73
- (QAM Systems) 1821-49
- DELAYS IN QUEUES WITH RANDOM SERVICE (USE OF GATE TO REDUCE VARIANCE) 1403-22
- $\Delta M/PCM$ ENCODERS (QUANTIZING NOISE) 183-204

- Derosier, R. M. 1229-35
 Descloux, A. 1375-402
 DFE *See* DECISION FEEDBACK EQUALIZATION
 DIELECTRIC-LINED WAVEGUIDE
 (Experimental Verification of Low-Loss TM Modes) 487-96
 (Overmoded Circular, Normal Modes) 453-86
 DIELECTRIC WAVEGUIDE (UNCLADDED, SCATTERING LOSSES CAUSED BY SUPPORT STRUCTURE) 205-17
 DIFFERENTIAL ATTENUATION
 (Rain-Induced at Microwave Frequencies) 599-604
 (Rain-Induced, Perturbation Calculations at Microwave Frequencies) 1907-13
 DIFFERENTIAL PCM SPEECH CODING (ADAPTIVE QUANTIZATION) 1105-18
 DIFFERENTIAL PHASE SHIFT
 (Rain-Induced at Microwave Frequencies) 599-604
 (Rain-Induced, Perturbation Calculations at Microwave Frequencies) 1907-13
 DIFFERENTIAL QUANTIZING NOISE (FRAME-TO-FRAME *Picturephone*® CODER SIGNALS) 35-51
 DIFFERENTIALLY PHASE-MODULATED DATA SIGNALS (PASSBAND EQUALIZATION) 219-38
 DIGITAL COMMUNICATION SYSTEMS (FIBER OPTIC, BASEBAND LINEARITY AND EQUALIZATION) 1175-94
 DIGITAL DATA SCRAMBLER (UNIVERSAL) 1851-65
 DIGITAL FIBER OPTIC COMMUNICATION SYSTEMS (RECEIVER DESIGN) 843-74, 875-86
 DIGITAL FILTERS
 (Algorithm for Minimizing Roundoff Noise in Cascade Realizations of FIR) 347-85
 (Design Rules for Optimum FIR Low-Pass) 769-99
 (Theory of Roundoff Noise in Cascade Realizations of FIR) 329-45
 DIGITAL OPTICAL COMMUNICATION SYSTEMS (APPLICATIONS FOR QUANTUM AMPLIFIERS) 117-33
 DIGITAL SIGNALS (ERROR RATES IN CHARGE TRANSFER DEVICES) 1795-809
 Dispersion and Equalization in Fiber Optic Communication Systems 1867-76
 DISTORTION IN A FREQUENCY CONVERTER (VOLTERRA SYSTEMS WITH MORE THAN ONE INPUT PORT) 1255-70
 Distortion Produced by Band Limitation of an FM Wave 605-26
 Distribution of $\Sigma a_n/n$, a_n Randomly Equal to ± 1 1097-103
 Dynamic Data Reallocation in Bubble Memories 307-17
- ## E
- Efficient Evaluation of Integrals of Analytic Functions by the Trapezoidal Rule* 707-22
 ELECTRICAL CIRCUITS PLANARITY (MODEL FOR TESTING) 135-42
 ELECTRONIC SYSTEMS (HEAT TRANSFER) 907-25
 "EMBEDDING" SCHEME (DC-TO-2.3-GHz AMPLIFIER) 53-62
 ENCODERS ($\Delta M/PCM$, QUANTIZING NOISE) 183-204
 EQUALIZATION AND DISPERSION (FIBER OPTIC COMMUNICATION SYSTEMS) 1867-76
 EQUALIZATION AND LINEARITY (BASEBAND, FIBER OPTIC DIGITAL COMMUNICATION SYSTEMS) 1175-94
 Equivalent Random Method With Renewal Inputs (The Accuracy of the) 1673-9
 Error Rates of Digital Signals in Charge Transfer Devices 1795-809
 Experimental Verification of Low-Loss TM Modes in Dielectric-Lined Waveguide 487-96
- ## F
- FADE (PHASE DISPERSION CHARACTERISTICS IN A MICROWAVE LINE-OF-SIGHT RADIO CHANNEL) 1877-902

- Faded Nondiversity and Space Diversity Narrowband Microwave Radio Channels (Selectively)* 239-61
- Falconer, D. D. 1541-62, 1821-49
- FEEDBACK EQUALIZATION (OPTIMUM MEAN-SQUARE DECISION) 1341-73
- FEEDBACK SYSTEM (PULSE-WIDTH MODULATED, STABILITY OF A GENERAL TYPE) 1811-9
- FIBER BUTT JOINTS (SINGLE-MODE OPTICAL, EFFECT OF MISALIGNMENTS ON COUPLING EFFICIENCY) 1439-48
- FIBER OPTIC COMMUNICATION SYSTEMS (DISPERSION AND EQUALIZATION) 1867-76
- FIBER OPTIC DIGITAL COMMUNICATION SYSTEMS (BASEBAND LINEARITY AND EQUALIZATION) 1175-94
- FIBERS
- (Clad Optical Multimode, Impulse Response) 801-16
 - (Graded-Core, Multimode Theory) 1563-78
 - (Impulse Response with Ring-Shaped Parabolic Index Distribution) 1161-8
 - (Optical) 265-9
 - (Optical, Low-Loss Splices) 1229-35
 - (Optical With Parabolic Index Profile, Impulse Response) 1169-74
 - (Parabolic Index With Random Bends, Losses and Impulse Response) 1423-37
 - (Round Optical, Coupled Mode Theory) 817-42
- FILTERS
- (Optimum FIR Low-Pass Digital) 769-99
 - (Synthesis of Multiple-Feedback Active) 527-55
- FINITE IMPULSE RESPONSE DIGITAL FILTERS *See* FIR DIGITAL FILTERS
- FINITE TRUNK GROUP WITH RENEWAL INPUT (PEAKEDNESS OF TRAFFIC CARRIED) 1617-42
- Finline Radiator (A)* 1249-53
- FIR DIGITAL FILTERS
- (Algorithm for Minimizing Roundoff Noise in Cascade Realizations of) 347-85
 - (Low-Pass, Optimum, Practical Design Rules) 769-99
 - (Theory of Roundoff Noise in Cascade Realizations) 329-45
- First-Come First-Served Queuing Systems With Peaked Inputs (Analysis of)* 1215-28
- Flanagan, J. L. 1105-18
- FM COMMUNICATION SYSTEMS (ANALOG, COMPUTING DISTORTION) 627-48
- FM WAVE (DISTORTION PRODUCED BY BAND LIMITATION) 605-26
- Formulas on Queues in Burst Processes-I* 9-33
- Foschini, G. J. 927-65, 1077-95, 1821-49
- Frame-to-Frame Picturephone® Coder for Signals Containing Differential Quantizing Noise (A)* 35-51
- Franks, R. L. 1195-214, 1589-615
- FREQUENCY CONVERTER (DISTORTION, VOLTERRA SYSTEMS WITH MORE THAN ONE INPUT PORT) 1255-70
- FREQUENCY-SELECTIVE FADING (NARROW-BAND MICROWAVE RADIO CHANNELS) 239-61
- FUNCTION CLASS (OPTIMAL APPROXIMATING MANIFOLDS) 1237-42

G

- Gain-Induced Modes in Planar Structures* 887-905
- Gate to Reduce the Variance of Delays in Queues With Random Service (Use of a)* 1403-22
- GAUSSIAN NOISE (PRESENCE IN TWO-DIMENSIONAL SIGNAL CONSTELLATION) 927-65
- Geometric Theory of Intersymbol Interference (A). Part I: Zero-Forcing and Decision-Feedback Equalization* 1483-519
- Geometric Theory of Intersymbol Interference (A). Part II: Performance of the Maximum Likelihood Detector* 1521-39
- GIBSON, T. A. 1691-724

- GILBERT'S BURST NOISE MODEL (STATISTICAL PROPERTIES) 1303-24
 Gitlin, R. D. 219-38, 927-65, 1077-95
 Gloge, D. 801-16, 1161-8, 1563-78,
 1579-88
 Goldman, J. 649-68
 Goldstein, A. J. 135-42
 Goodman, D. J. 183-204
 Gopinath, B. 9-33
 GRADED-CORE FIBERS (MULTIMODE THEORY) 1563-78
 Greenstein, L. J. 183-204, 387-421
 Grow, R. J. 1439-48

H

- Haskell, B. G. 35-51
Heat Transfer in Electronic Systems With Emphasis on Asymmetric Heating
 907-25
 Heffes, H. 1215-28, 1617-42
 Heindel, L. E. 1743-63
 Henderson, D. M. 1867-76
 Henry, P. S. 1031-5
 Herrmann, O. 769-99
Heuristic Solution of a Signal Design Optimization Problem 1145-59
 HIERARCHICAL DATA BASES (OFF-THE-SHELF SYSTEM) 1743-63
 HIERARCHICAL DATA SYSTEM (MASTER LINKS) 1691-724
 HIGH-FREQUENCY AMPLIFIER (DC-TO-2.3-GHz USING "EMBEDDING" SCHEME)
 53-62
 Ho, E. Y. 219-38
 Hogg, D. C. 1249-53
 Holtzman, J. M. 1617-42, 1673-9
 Hubbard, W. M. 731-65

I

- IMPACT AVALANCHE AND TRANSIT TIME
See IMPATT
 IMPATT OSCILLATORS (ELIMINATION OF TUNING-INDUCED BURNOUT AND BIAS-CIRCUIT OSCILLATIONS) 271-306
Impulse Response of an Optical Fiber With Parabolic Index Profile (The)
 1169-74

- Impulse Response of Clad Optical Multimode Fibers* 801-16
Impulse Response of Fibers With Ring-Shaped Parabolic Index Distribution
 1161-8
 IMPULSE RESPONSE OF PARABOLIC INDEX FIBER WITH RANDOM BENDS (LOSSES AND) 1423-37
Incomplete Charge Transfer in Charge Transfer Devices (A Fundamental Comparison of) 147-82
 INDEX FIBER WITH RANDOM BENDS (PARABOLIC, LOSSES AND IMPULSE RESPONSE) 1423-37
 INFORMATION MANAGEMENT SYSTEM
Interactive Information Management Systems 1681-9
 MASTER LINKS—A Hierarchical Data System 1691-724
Natural Dialogue System (The)
 1725-41

- Off-The-Shelf System—A Packaged Information Management System (The)*
 1743-63

- INTEGRALS OF ANALYTIC FUNCTIONS (EFFICIENT EVALUATION BY TRAPEZOIDAL RULE) 707-22

- Interactive Information Management Systems* 1681-9

- Interrupted Poisson Process as an Overflow Process (The)* 437-48

- INTERSYMBOL INTERFERENCE 1097-103
 (Geometric Theory; Performance of Maximum Likelihood Detector)
 1521-39

- (Geometric Theory; Zero-Forcing and Decision-Feedback Equalization)
 1483-519

- INTRAFRAME CODECS FOR Picturephone® SERVICE (PREFILTERS, SAMPLING, AND TRANSMISSION RATES) 497-525

- Isaacs, J. C., Jr. 101-15

J

- Jayant, N. S. 1105-18, 1119-44
 JOINING SINGLE-MODE OPTICAL FIBERS
 1439-48

K

- Kahng, D. 1-7
 Kaiser, P. 265-9
 Kent, W. H. 1009-24
 Kernighan, B. W. 1145-59
 Kosicki, B. B. 1-7
 Krupp, R. S. 991-1007
 Kuczura, A. 83-99, 437-48, 967-90

L

- Leeper, D. G. 1851-65
 Legg, W. E. 1249-53
 Limb, J. O. 1271-302
 Lin, S. 1145-59
 Lin, S. H. 557-81
 LINE-OF-SIGHT RADIO CHANNEL (MICROWAVE, PHASE DISPERSION CHARACTERISTICS DURING FADE) 1887-902
 LINEAR DELTA MODULATORS WITH GAUSSIAN INPUTS (SLOPE OVERLOAD NOISE) 387-421
 LINEARITY AND EQUALIZATION (BASEBAND, FIBER OPTIC DIGITAL COMMUNICATION SYSTEMS) 1175-94
 LOSS SYSTEMS WITH RENEWAL INPUT (TRAFFIC-MEASUREMENT ERRORS) 967-90
Losses and Impulse Response of a Parabolic Index Fiber With Random Bends 1423-37
 LOSSY TRANSMISSION LINES (UNIFORMLY COUPLED, CROSSTALK IN) 101-15
 LOW-BANDWIDTH CHANNELS (OPTICAL-FREQUENCY CARRIERS) 731-65
 LOW-LOSS JOINTS (SIMPLE) BETWEEN SINGLE-MODE OPTICAL FILTERS 583-96
 LOW-LOSS SPLICES (OPTICAL FIBER END PREPARATION) 1579-88
Low-Loss Splices in Optical Fibers 1229-35
 LOW-LOSS TM MODES (EXPERIMENTAL VERIFICATION IN DIELECTRIC-LINED WAVEGUIDE) 487-96
 LOW-PASS DIGITAL FILTERS (DESIGN RULES FOR OPTIMUM FIR) 769-99

M

- Magee, F. R., Jr. 1541-62
 Maione, A. 487-96
 Mammel, W. L. 423-35, 1439-48
 Marcatili, E. A. J. 265-9, 1161-8, 1563-78
 Marcuse, D. 63-82, 205-17, 423-35, 817-42, 1169-74, 1423-37
 MASTER LINKS—A Hierarchical Data System 1691-724
 MAXIMUM LIKELIHOOD DETECTOR PERFORMANCE (GEOMETRIC THEORY OF INTERSYMBOL INTERFERENCE) 1521-39
 MAXIMUM LIKELIHOOD SEQUENCE ESTIMATION (ADAPTIVE CHANNEL MEMORY TRUNCATION) 1541-62
 Mazo, J. E. 219-38
 McKenna, J. 669-96, 1765-93
 MEAN-SQUARE DECISION FEEDBACK EQUALIZATION (OPTIMUM) 1341-73
 MEAN-SQUARE-ERROR QAM SYSTEMS (MINIMUM) EMPLOYING DECISION FEEDBACK EQUALIZATION 1821-49
Measurements of Transfer Inefficiency of 250-Element Undercut-Isolated Charge Coupled Devices 1-7
 MEMORIES (BUBBLE, DYNAMIC DATA REALLOCATION) 307-17
 MEMORY (ONE-WORD, ADAPTIVE QUANTIZATION) 1119-44
 MEMORY TRUNCATION (ADAPTIVE CHANNEL) FOR MAXIMUM LIKELIHOOD SEQUENCE ESTIMATION 1541-62
 Messerschmitt, D. G. 1483-519, 1521-39
Metallurgy of Remendur: Effects of Processing Variations (The) 1325-40
 MICROWAVE FREQUENCIES
 (Perturbation Calculations of Rain-Induced Differential Attenuation and Phase Shift) 1907-13
 (Rain-Induced Differential Attenuation and Differential Phase Shift) 599-604
 MICROWAVE LINE-OF-SIGHT RADIO CHANNEL (PHASE DISPERSION CHARACTERISTICS DURING FADE) 1877-902

- MICROWAVE RADIO CHANNELS (NARROW-BAND, SELECTIVELY FADED NON-DIVERSITY AND SPACE DIVERSITY) 239-61
- MICROWAVE RAIN ATTENUATION (STATISTICAL BEHAVIOR) 557-81
- Miller, S. E. 265-9
- Minimum Mean-Square-Error QAM Systems Employing Decision Feedback Equalization (Theory of)* 1821-49
- Misalignments on Coupling Efficiency of Single-Mode Optical Fiber Butt Joints (Effect of)* 1439-48
- Mitra, D. 9-33
- MODE COUPLING (ROUND OPTICAL FIBERS) 817-42
- Model Approximations to Visual Spatio-Temporal Sine-Wave Threshold Data* 1643-67
- Model for Testing the Planarity of Electrical Circuits (A Proper)* 135-42
- MODERATE-BANDWIDTH CHANNELS (OPTICAL-FREQUENCY CARRIERS) 731-65
- MODES IN PLANAR STRUCTURES (GAIN-INDUCED) 887-905
- Morrison, J. A. 599-604, 1907-13
- Mounts, F. W. 35-51
- MUELLER, K. H. 723-9
- MULTIMODE FIBERS (CLAD OPTICAL, IMPULSE RESPONSE) 801-16
- MULTIMODE PARABOLIC INDEX FIBERS 1423-37
- Multimode Theory of Graded-Core Fibers* 1563-78
- MULTIPLE ACCESS CHANNELS WITH CORRELATED SOURCES (CODING THEOREM) 1037-76
- MULTIPLE-FEEDBACK ACTIVE FILTERS (SYNTHESIS) 527-55
- MULTISERVER QUEUE, CONSTANT SERVICE TIMES (BATCH INPUT) 83-99
- N**
- NARROWBAND MICROWAVE RADIO CHANNELS (FREQUENCY-SELECTIVE FADING) 239-61
- Natural Dialogue System (The)* 1725-41
- NDS *See* NATURAL DIALOGUE SYSTEM
- Neal, S. R. 967-90
- Nelson, T. J. 307-17
- Netravali, A. 1237-42
- NETWORK CALL-CARRYING CAPACITY (OPTIMUM) 1195-214
- NETWORKS (NONBLOCKING, SEMILATTICE CHARACTERIZATION) 697-706
- NOISE
- (Differential Quantizing, Frame-to-Frame Picturephone® Coder Signals) 35-51
- (Quantizing, ΔM /PCM Encoders) 183-204
- (Slope Overload) Linear Data Modulators with Gaussian Inputs 387-421
- NONBLOCKING NETWORKS (SEMILATTICE CHARACTERIZATION) 697-706
- Normal Modes in Overmoded Dielectric-Lined Circular Waveguide* 453-86
- O**
- O'Brien, K. C. 1877-902
- Off-The-Shelf System—A Packaged Information Management System (The)* 1743-63
- ONE-WORD MEMORY (ADAPTIVE QUANTIZATION) 1119-44
- Operational Limitations of Charge Transfer Devices* 1453-82
- OPTICAL COMMUNICATION SYSTEMS (Digital Fiber, Receiver Design) 843-74, 875-86
- (Fiber, Dispersion and Equalization) 1867-76
- (Simple Digital, Applications for Quantum Amplifiers) 117-33
- Optical Fiber (A New)* 265-9
- OPTICAL FIBER BUTT JOINTS (SINGLE-MODE, EFFECT OF MISALIGNMENTS ON COUPLING EFFICIENCY) 1439-48
- Optical Fiber End Preparation for Low-Loss Splices* 1579-88
- OPTICAL FIBERS
- (Clad Multimode, Impulse Response) 801-16
- (Impulse Response with Parabolic Index Profile) 1169-74

- (Low-Loss Splices) 1229-35
(Round, Coupled Mode Theory) 817-42
(Single Mode; Simple, Low-Loss Joints Between) 583-96
Optical-Frequency Carriers for Low- and Moderate-Bandwidth Channels (Utilization of) 731-65
OPTICAL TRANSMISSION (TUBE WAVEGUIDE) 423-35
Optimal Approximating Manifolds of a Function Class (A Note on) 1237-42
OPTIMIZATION (SIGNAL DESIGN, HEURISTIC SOLUTION) 1145-59
Optimum Mean-Square Decision Feedback Equalization 1341-73
Optimum Network Call-Carrying Capacity 1195-214
Optimum Pulse Shaping in Sampled Systems Using Time-Domain Filtering (A New Approach to) 723-9
ORTHOGONALITY OF TWO POLARIZATIONS IN RADIO COMMUNICATION SYSTEMS, II (RESTORING THE) 319-27
OTSS See OFF-THE-SHELF SYSTEM
OVERFLOW PROCESS (INTERRUPTED POISSON PROCESS) 437-48
Overload Model of Telephone Network Operation 1589-615
OVERMODED DIELECTRIC-LINED CIRCULAR WAVEGUIDE (NORMAL MODES) 453-86
- P**
- PARABOLIC INDEX FIBER WITH RANDOM BENDS (LOSSES AND IMPULSE RESPONSE) 1423-37
PARABOLIC INDEX PROFILE (IMPULSE RESPONSE OF OPTICAL FIBER) 1169-74
PARTIAL SAMPLING (TRAFFIC MEASUREMENT BIASES) 1375-402
Passband Equalization of Differentially Phase-Modulated Data Signals 219-38
PCM SPEECH CODING (DIFFERENTIAL, ADAPTIVE QUANTIZATION) 1105-18
Peakedness of Traffic Carried by a Finite Trunk Group With Renewal Input 1617-42
PERFORMANCE INVARIANCE (INCORPORATED IN A COMPROMISE EQUALIZER DESIGN) 1077-95
Personick, S. D. 117-33, 843-74, 875-86, 1175-94
Perturbation Calculations of Rain-Induced Differential Attenuation and Differential Phase Shift at Microwave Frequencies 1907-13
Phase Dispersion Characteristics During Fade in a Microwave Line-of-Sight Radio Channel 1877-902
PHASE JITTER (PRESENCE IN TWO-DIMENSIONAL SIGNAL CONSTELLATION) 927-65
Picture Coding: The Use of a Viewer Model in Source Encoding 1271-302
Picturephone®
 Coder (Frame-to-Frame) for Signals Containing Differential Quantizing Noise 35-51
 Service (Prefilters, Sampling and Transmission Rates, Intraframe Codes) 497-525
PINNEL, M. R. 1325-40
PLANAR SHIFTING ARRAYS (SWITCHING NETWORKS) 991-1007
PLANAR STRUCTURES (GAIN-INDUCED MODES) 887-905
PLANARITY OF ELECTRICAL CIRCUITS (PROPER MODEL FOR TESTING) 135-42
POISSON PROCESS (INTERRUPTED, AS OVERFLOW PROCESS) 437-48
POLARIZATIONS IN RADIO COMMUNICATION SYSTEMS, II (RESTORING THE ORTHOGONALITY OF TWO) 319-27
Potential in a Charge-Coupled Device With No Mobile Minority Carriers (The) 1765-93
Potential in a Charge-Coupled Device With No Mobile Minority Carriers and Zero Plate Separation (The) 669-96
Practical Design Rules for Optimum Finite Impulse Response Low-Pass Digital Filters 769-99
Prefilters, Sampling, and Transmission Rates for Intraframe Codes for *Picturephone®* Service 497-525

Puerling, B. W. 1725-41
 Puglis, P. J. 1877-902
 PULSE SHAPING (OPTIMUM) IN SAMPLED
 SYSTEMS USING TIME-DOMAIN FIL-
 TERING 723-9
 PULSE-WIDTH-MODULATED FEEDBACK
 SYSTEM (STABILITY OF A GENERAL
 TYPE) 1811-19
 PWM See PULSE-WIDTH-MODULATED

Q

QAM SYSTEMS (THEORY OF MINIMUM
 MEAN-SQUARE-ERROR EMPLOYING
 DECISION FEEDBACK EQUALIZATION)
 1821-49
 QUADRATURE-AMPLITUDE MODULATION
 See QAM
 Quantizing Noise of $\Delta M/PCM$ Encoders
 183-204
 QUANTUM AMPLIFIERS (SIMPLE DIGITAL
 OPTICAL COMMUNICATION SYSTEMS,
 APPLICATIONS) 117-33
 QUEUES
 (Formulas) in Burst Processes 9-33
 (Multiserver with Constant Service
 Times, Batch Input) 83-99
 (Random Service, Use of Gate to Re-
 duce Variance of Delays) 1403-22
 QUEUING SYSTEMS (ANALYSIS OF FIRST-
 COME FIRST-SERVED WITH PEAKED
 INPUTS) 1215-28

R

Rabiner, L. R. 329-45, 347-85, 769-99
 RADIO CHANNEL (MICROWAVE LINE-OF-
 SIGHT, PHASE DISPERSION CHARAC-
 TERISTICS DURING FADE) 1877-902
 RADIO COMMUNICATION SYSTEMS, II (RE-
 STORING THE ORTHOGONALITY OF TWO
 POLARIZATIONS IN) 319-27
 RAIN ATTENUATION (STATISTICAL BE-
 HAVIOR) 557-81
 Rain-Induced Differential Attenuation and
 Differential Phase Shift at Microwave
 Frequencies 599-604
 (Perturbation Calculations) 1907-13

Rain on Circular Polarization at 18 GHz
 (The Effect of) 1029-31
 Rainal, A. J. 627-48
 RANDOM SERVICE (USE OF GATE TO RE-
 DUCE VARIANCE OF DELAYS IN
 QUEUES) 1403-22
 Receiver Design for Digital Fiber Optic Com-
 munication Systems, I 843-74
 Receiver Design for Digital Fiber Optic Com-
 munication Systems, II 875-86
 RECEIVING-MODEL CODING 1271-203
 REMENDUR (EFFECTS OF PROCESSING
 VARIATIONS) 1325-40
 RENEWAL INPUTS
 (Accuracy of Equivalent Random
 Method) 1673-9
 (Peakedness of Traffic Carried by Finite
 Trunk Group) 1617-42
 (Traffic-Measurement Errors for Loss
 Systems) 967-90
 Restoring the Orthogonality of Two Polariza-
 tions in Radio Communication Sys-
 tems, II 319-27
 Rice, S. O. 605-26, 707-22, 1097-103,
 1255-70
 RING-SHAPED PARABOLIC INDEX DIS-
 TRIBUTION (IMPULSE RESPONSE OF
 FIBERS) 1161-8
 Rishel, R. W. 1195-214, 1589-615
 Roberto, J. T. 1725-41, 1743-63
 Rootenberg, J. 1811-9
 ROUND-OFF NOISE IN CASCADE REALIZA-
 TIONS OF FIR DIGITAL FILTERS
 (Algorithm for Minimizing) 347-85
 (Theory) 329-45

S

Salz, J. 1341-73
 SAMPLING AND TRANSMISSION RATES
 (INTRAFRAME CODECS FOR Picture-
 phone® SERVICE) 497-525
 Scattering Losses Caused by the Support
 Structure of an Uncladded Fiber
 205-17
 Schlosser, W. O. 887-905
 Schryer, N. L. 669-96, 1765-93
 Schweikert, D. G. 135-42

- SCRAMBLER (UNIVERSAL DIGITAL DATA) 1851-65
Semilattice Characterization of Nonblocking Networks 697-706
 Semplak, R. A. 1029-31
- SIGNAL CONSTELLATION (TWO-DIMENSIONAL SELECTION) IN PRESENCE OF PHASE JITTER AND GAUSSIAN NOISE 927-65
- SIGNAL DESIGN OPTIMIZATION PROBLEM (HEURISTIC SOLUTION) 1145-59
Simple, Low-Loss Joints Between Single-Mode Optical Fibers 583-96
- SINGLE-MODE OPTICAL FIBER BUTT JOINTS (EFFECT OF MISALIGNMENTS ON COUPLING EFFICIENCY) 1439-48
- SINGLE-MODE OPTICAL FIBERS (SIMPLE, LOW-LOSS JOINTS BETWEEN) 583-96
- SLAB WAVEGUIDES (IMPERFECT ASYMMETRIC, COUPLING COEFFICIENTS) 63-82
- Slepian, D. 1037-76
Slope Overload Noise in Linear Delta Modulators With Gaussian Inputs 387-421
- Smith, P. W. 1579-88
 Smeda, C. G. 583-96
 Sondhi, M. M. 9-33
- SOURCE ENCODING (PICTURE CODING: USING A VIEWER MODEL) 1271-302
- SPATIO-TEMPORAL MODELS OF VISUAL FILTERING 1643-67
- SPICES (LOW-LOSS IN OPTICAL FIBERS) 1229-35
Stability of a General Type of Pulse-Width-Modulated Feedback System 1811-9
Statistical Behavior of Rain Attenuation 557-81
Statistical Properties of Gilbert's Burst Noise Model 1303-24
- Stockhausen, P. F. 1691-724
- Stone, J. 1229-35
- Strakhov, N. A. 101-15
- Subramanian, M. 1877-902
- SUPPORT STRUCTURE OF AN UNCLADDED FIBER (SCATTERING LOSSES) 205-17
Switching Networks of Planar Shifting Arrays 991-1007
- Synthesis of Multiple-Feedback Active Filters* 527-55
 Szentirmai, G. 527-55
- T
- TELEPHONE NETWORK OPERATION (OVERLOAD MODEL) 1589-615
Theory of Roundoff Noise in Cascade Realizations of Finite Impulse Response Digital Filters 329-45
- Thornber, K. K. 147-82, 1453-82, 1795-809
- THRESHOLD DATA (MODEL APPROXIMATIONS TO VISUAL SPATIO-TEMPORAL SINE-WAVE) 1643-67
- TIME-DOMAIN FILTERING (OPTIMUM PULSE SHAPING IN SAMPLED SYSTEMS USING) 723-9
- TM MODES (LOW-LOSS, EXPERIMENTAL VERIFICATION IN DIELECTRIC-LINED WAVEGUIDE) 487-96
- Tomko, L. A. 991-1007
- Tompsett, M. F. 1-7
Traffic-Measurement Biases Induced by Partial Sampling 1375-402
Traffic-Measurement Errors for Loss Systems With Renewal Input (A Theory of) 967-90
- TRANSFER INEFFICIENCY (250-ELEMENT UNDERCUT-ISOLATED CHARGE COUPLED DEVICES, MEASUREMENTS) 1-7
- TRANSMISSION AND SAMPLING RATES (INTRAFRAME CODECS FOR Picturephone® SERVICE) 497-525
- TRANSMISSION LINES (UNIFORMLY COUPLED LOSSY, CROSSTALK) 101-15
- TRAPEZOIDAL RULE (EFFICIENT EVALUATION OF INTEGRALS OF ANALYTIC FUNCTIONS) 707-22
- Tube Waveguide for Optical Transmission* 423-35
- Tuning-Induced Burnout and Bias-Circuit Oscillations in IMPATT Oscillators (The Elimination of)* 271-306
- Two-Dimensional Signal Constellation in the Presence of Phase Jitter and Gaussian Noise (On the Selection of a)* 927-65

U

- UNCLADDED FIBER (SCATTERING LOSSES
CAUSED BY SUPPORT STRUCTURE)
205-17
- Universal Digital Data Scrambler (A)*
1851-65

V

- VIEWER MODEL (PICTURE CODING: USE
IN SOURCE ENCODING) 1271-302
- VISUAL SPATIO-TEMPORAL SINE-WAVE
THRESHOLD DATA (MODEL APPROXI-
MATIONS) 1643-67
- Volterra Series Description of Crosstalk In-
terference in Communication Systems
(A)* 649-68
- Volterra Systems With More Than One
Input Port—Distortion in a Frequency
Converter* 1255-70

W

- Walk, R. 1811-9
- WAVEGUIDE
(Dielectric-Lined, Experimental Veri-
fication of Low-Loss TM Modes)
487-96
(Overmoded Dielectric-Lined Circular,
Normal Modes) 453-86
- WAVEGUIDES (IMPERFECT ASYMMETRIC
SLAB, COUPLING COEFFICIENTS)
63-82
- Weinstein, S. B. 927-65
- White, G. 53-62
- Wier, J. M. 1681-9
- Wolf, J. K. 1037-76

Z

- ZERO-FORCING AND DECISION-FEEDBACK
EQUALIZATION (GEOMETRIC THEORY
OF INTERSYMBOL INTERFERENCE)
1483-519



1973 Contents

January

Measurements of Transfer Inefficiency of 250-Element Undercut-Isolated Charge Coupled Devices	M. F. Tompsett, B. B. Kosicki, and D. Kahng	1
Formulas on Queues in Burst Processes-I	B. Gopinath, D. Mitra, and M. M. Sondhi	9
A Frame-to-Frame <i>Picturephone</i> ® Coder for Signals Containing Differential Quantizing Noise	D. J. Connor, B. G. Haskell, and F. W. Mounts	35
A DC-to-2.3-GHz Amplifier Using an "Embedding" Scheme	G. White and G. M. Chin	53
Coupling Coefficients for Imperfect Asymmetric Slab Waveguides	D. Marcuse	63
Batch Input to a Multiserver Queue With Constant Service Times	A. Kuczura	83
Crosstalk in Uniformly Coupled Lossy Transmission Lines	J. C. Isaacs, Jr., and N. A. Strakhov	101
Applications for Quantum Amplifiers in Simple Digital Optical Communications Systems	S. D. Personick	117
A Proper Model for Testing the Planarity of Electrical Circuits	A. J. Goldstein and D. G. Schweikert	135
Contributors to This Issue		143

February

A Fundamental Comparison of Incomplete Charge Transfer in Charge Transfer Devices	C. N. Berglund and K. K. Thornber	147
Quantizing Noise of ΔM /PCM Encoders	D. J. Goodman and L. J. Greenstein	183
Scattering Losses Caused by the Support Structure of an Uncladded Fiber	D. Marcuse	205
Passband Equalization of Differentially Phase-Modulated Data Signals	R. D. Gitlin, E. Y. Ho, and J. E. Mazo	219

Selectively Faded Nondiversity and Space Diversity Narrowband Microwave Radio Channels	G. M. Babler	239
Contributors to This Issue		263
B.S.T.J. Brief: A New Optical Fiber	P. Kaiser, E. A. J. Marcatili, and S. E. Miller	265

March

The Elimination of Tuning-Induced Burnout and Bias- Circuit Oscillations in IMPATT Oscillators	C. A. Brackett	271
Dynamic Data Reallocation in Bubble Memories	P. I. Bonyhard and T. J. Nelson	307
Restoring the Orthogonality of Two Polarizations in Radio Communication Systems, II	T. S. Chu	319
Theory of Roundoff Noise in Cascade Realizations of Finite Impulse Response Digital Filters	D. S. K. Chan and L. R. Rabiner	329
An Algorithm for Minimizing Roundoff Noise in Cas- cade Realizations of Finite Impulse Response Digital Filters	D. S. K. Chan and L. R. Rabiner	347
Slope Overload Noise in Linear Delta Modulators With Gaussian Inputs	L. J. Greenstein	387
Tube Waveguide for Optical Transmission	D. Marcuse and W. L. Mammel	423
The Interrupted Poisson Process as an Overflow Process	A. Kuczura	437
Contributors to This Issue		449

April

Normal Modes in Overmoded Dielectric-Lined Circu- lar Waveguide	J. W. Carlin and P. D'Agostino	453
Experimental Verification of Low-Loss TM Modes in Dielectric-Lined Waveguide	J. W. Carlin and A. Maione	487
Prefilters, Sampling, and Transmission Rates for Intraframe Codecs for <i>Picturephone</i> ® Service	R. T. Bobilin	497
Synthesis of Multiple-Feedback Active Filters	G. Szentirmai	527
Statistical Behavior of Rain Attenuation	S. H. Lin	557

Simple, Low-Loss Joints Between Single-Mode Optical Fibers	C. G. Someda	583
Contributors to This Issue		597
B.S.T.J. Brief: Rain-Induced Differential Attenu- ation and Differential Phase Shift at Microwave Frequencies	J. A. Morrison, M. J. Cross, and T. S. Chu	599

May-June

Distortion Produced by Band Limitation of an FM Wave	S. O. Rice	605
Computing Distortion in Analog FM Communication Systems	A. J. Rainal	627
A Volterra Series Description of Crosstalk Interference in Communications Systems	J. Goldman	649
The Potential in a Charge Coupled Device With No Mobile Minority Carriers and Zero Plate Separation	J. McKenna and N. L. Schryer	669
Semilattice Characterization of Nonblocking Networks	V. E. Beneš	697
Efficient Evaluation of Integrals of Analytic Functions by the Trapezoidal Rule	S. O. Rice	707
A New Approach to Optimum Pulse Shaping in Sampled Systems Using Time-Domain Filtering	K. H. Mueller	723
Utilization of Optical-Frequency Carriers for Low- and Moderate-Bandwidth Channels	W. M. Hubbard	731
Contributors to This Issue		767

July-August

Practical Design Rules for Optimum Finite Impulse Response Low-Pass Digital Filters	O. Herrmann, L. R. Rabiner, and D. S. K. Chan	769
Impulse Response of Clad Optical Multimode Fibers	D. Gloge	801
Coupled Mode Theory of Round Optical Fibers	D. Marcuse	817
Receiver Design for Digital Fiber Optic Communication Systems, I	S. D. Personick	843

Receiver Design for Digital Fiber Optic Communication Systems, II	S. D. Personick	875
Gain-Induced Modes in Planar Structures	W. O. Schlosser	887
Heat Transfer in Electronic Systems With Emphasis on Asymmetric Heating	W. Aung	907
On the Selection of a Two-Dimensional Signal Constel- lation in the Presence of Phase Jitter and Gaussian Noise	G. J. Foschini, R. D. Gitlin, and S. B. Weinstein	927
A Theory of Traffic-Measurement Errors for Loss Systems With Renewal Input	S. R. Neal and A. Kuczura	967
Switching Networks of Planar Shifting Arrays	R. S. Krupp and L. A. Tomko	991
Charge Distribution in Buried-Channel Charge- Coupled Devices	W. H. Kent	1009
Contributors to This Issue		1025
B.S.T.J. Briefs:		
The Effect of Rain on Circular Polarization at 18 GHz	R. A. Semplak	1029
Attenuation Through the Clear Atmosphere at 30, 19, and 13 GHz for Low Elevation Angles	P. S. Henry	1031

September

A Coding Theorem for Multiple Access Channels With Correlated Sources	D. Slepian and J. K. Wolf	1037
A Compromise Equalizer Design Incorporating Per- formance Invariance	F. J. Brophy, G. J. Foschini, and R. D. Gitlin	1077
Distribution of $\sum a_n/n$, a_n Randomly Equal to ± 1	S. O. Rice	1097
Adaptive Quantization in Differential PCM Coding of Speech	P. Cummiskey, N. S. Jayant, and J. L. Flanagan	1105
Adaptive Quantization With a One-Word Memory	N. S. Jayant	1119
Heuristic Solution of a Signal Design Optimization Problem	B. W. Kernighan and S. Lin	1145

Impulse Response of Fibers With Ring-Shaped Parabolic Index Distribution	D. Gloge and E. A. J. Marcatili	1161
The Impulse Response of an Optical Fiber With Parabolic Index Profile	D. Marcuse	1169
Baseband Linearity and Equalization in Fiber Optic Digital Communication Systems	S. D. Personick	1175
Optimum Network Call-Carrying Capacity	R. L. Franks and R. W. Rishel	1195
Analysis of First-Come First-Served Queuing Systems With Peaked Inputs	H. Heffes	1215
Low-Loss Splices in Optical Fibers	R. M. Derosier and J. Stone	1229
A Note on Optimal Approximating Manifolds of a Function Class	A. Netravali	1237
Contributors to This Issue		1243
B.S.T.J. Brief: A Finline Radiator	D. C. Hogg and W. E. Legg	1249

October

Volterra Systems With More Than One Input Port—Distortion in a Frequency Converter	S. O. Rice	1255
Picture Coding: The Use of a Viewer Model in Source Encoding	J. O. Limb	1271
Statistical Properties of Gilbert's Burst Noise Model	M.-T. Chao	1303
The Metallurgy of Remendur: Effects of Processing Variations	M. R. Pinnel and J. E. Bennett	1325
Optimum Mean-Square Decision Feedback Equalization	J. Salz	1341
Traffic Measurement Biases Induced by Partial Sampling	A. Descloux	1375
Use of a Gate to Reduce the Variance of Delays in Queues With Random Service	R. D. Coleman	1403
Losses and Impulse Response of a Parabolic Index Fiber With Random Bends	D. Marcuse	1423

Effect of Misalignments on Coupling Efficiency of Single-Mode Optical Fiber Butt Joints	
J. S. Cook, W. L. Mammel, and R. J. Grow	1439
Contributors to This Issue	1449

November

Operational Limitations of Charge Transfer Devices	
K. K. Thornber	1453
A Geometric Theory of Intersymbol Interference. Part I: Zero-Forcing and Decision-Feedback Equalization	
D. G. Messerschmitt	1483
A Geometric Theory of Intersymbol Interference. Part II. Performance of the Maximum Likelihood Detector	
D. G. Messerschmitt	1521
Adaptive Channel Memory Truncation for Maximum Likelihood Sequence Estimation	
D. D. Falconer and F. R. Magee, Jr.	1541
Multimode Theory of Graded-Core Fibers	
D. Gloge and E. A. J. Marcatili	1563
Optical Fiber End Preparation for Low-Loss Splices	
D. Gloge, P. W. Smith, D. L. Bisbee, and E. L. Chinnock	1579
Overload Model of Telephone Network Operation	
R. L. Franks and R. W. Rishel	1589
Peakedness of Traffic Carried by a Finite Trunk Group With Renewal Input	
H. Heffes and J. M. Holtzman	1617
Model Approximations to Visual Spatio-Temporal Sine-Wave Threshold Data	
Z. L. Budrikis	1643
Contributors to This Issue	1669
B.S.T.J. Brief: The Accuracy of the Equivalent Random Method With Renewal Inputs	
J. M. Holtzman	1673

December

INFORMATION MANAGEMENT SYSTEM

Interactive Information Management Systems	
D. T. Chai and J. M. Wier	1681

MASTER LINKS—A Hierarchical Data System	
T. A. Gibson and P. F. Stockhausen	1691
The Natural Dialogue System	
B. W. Puerling and J. T. Roberto	1725
The-Off-The-Shelf System—A Packaged Information Management System	
L. E. Heindel and J. T. Roberto	1743

GENERAL ARTICLES

The Potential in a Charge-Coupled Device With No Mobile Minority Carriers	J. McKenna and N. L. Schryer	1765
Error Rates of Digital Signals in Charge Transfer Devices	K. K. Thornber	1795
Stability of a General Type of Pulse-Width-Modulated Feedback System	R. Walk and J. Rootenberg	1811
Theory of Minimum Mean-Square-Error QAM Systems Employing Decision Feedback Equalization	D. D. Falconer and G. J. Foschini	1821
A Universal Digital Data Scrambler	D. G. Leeper	1851
Dispersion and Equalization in Fiber Optic Communication Systems	D. M. Henderson	1867
Phase Dispersion Characteristics During Fade in a Microwave Line-of-Sight Radio Channel	M. Subramanian, K. C. O'Brien, and P. J. Puglis	1877
Contributors to This Issue		1903
B.S.T.J. Brief: Perturbation Calculations of Rain-Induced Differential Attenuation and Differential Phase Shift at Microwave Frequencies	J. A. Morrison and T. S. Chu	1907